Summary.

The chief features of the Sun-spots of 1889 are:—

1. The Sun-spots were fewer and smaller than in 1888.
2. But the second half of 1889 was more prolific than the first half.
3. In the second half of the year several spot-groups appeared in high latitudes, so that the spots were congregated in three distinct zones.
4. The average duration of a group was double what it was in 1888. There was less tendency to intermittent action, and a greater tendency to continued action.
5. Some of the larger groups showed a drift remarkable for rapidity and irregularity.

A Mechanical Theory of the Solar Corona. By J. M. Schaeberle.

(*Communicated by E. B. Knobel.*)

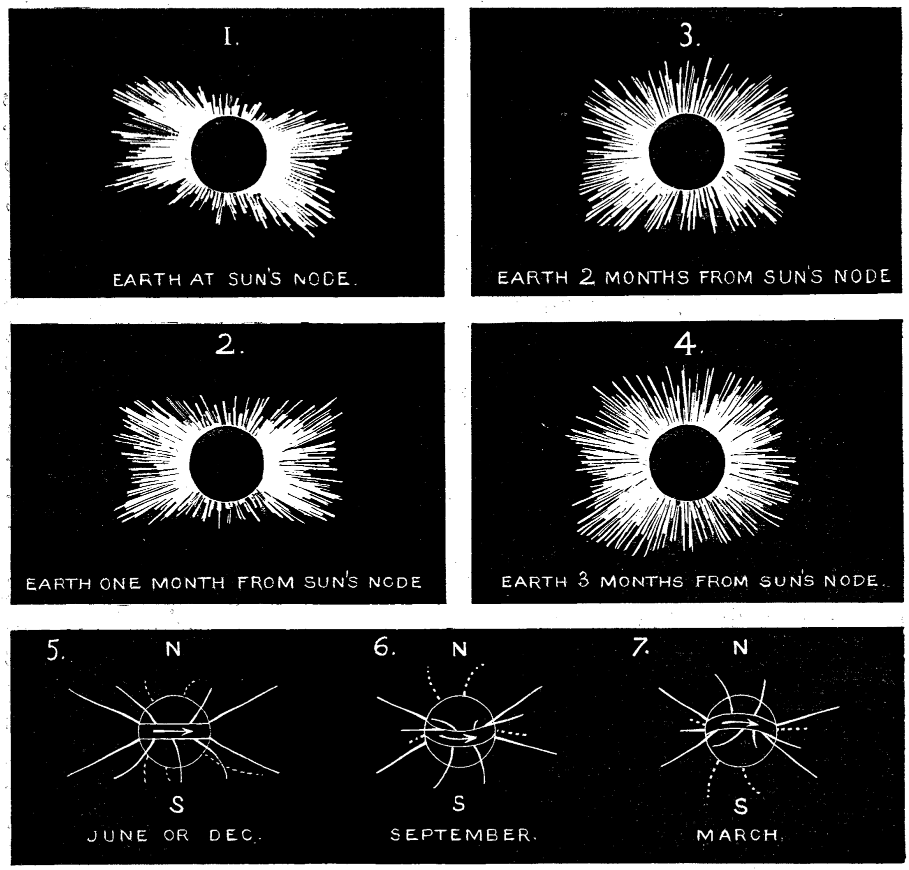
My investigations seem to prove conclusively that the solar corona is caused by light emitted and reflected from streams of matter ejected from the Sun by forces which, in general, act along lines normal to the surface These forces are most active near the centre of each Sun-spot zone.

On account of the rotation of the Sun the nearer portions of the stream will have a greater angular velocity than the more distant parts, resulting in a stream of double curvature, each individual particle of the stream, however, describing the same conic section, which for velocities less than about 383 miles per second is a very eccentric ellipse (assuming that the Sun's atmosphere is very rare, as is apparently shown by various observations).

Owing to the change in the position of the observer with reference to the plane of the Sun's equator (according as he is above, below, or in this plane), the perspective overlapping and interlacing of the two sets of streamers causes the observed apparent change in the type of the corona.

In the diagrams numbered 5, 6, and 7 I have purposely exaggerated the curvature of the streams in order to show more forcibly the perspective effect when viewed from different parts of the Earth's orbit. All the other illustrations are prints made from the same model, in which the Sun is represented by a ball something over an inch in diameter, from which radiate a number of needles to represent the streams of matter. All these needles are contained between two small circles corresponding to 30° of north and south latitude, the longer ones being found near the middle of each zone, and slightly more inclined to the normal than the shorter ones, in order that the more distant portions of

the needles (representing the outgoing streams) shall have inclinations roughly the same as required by physical laws.



When the model is placed in a beam of parallel rays and its shadow allowed to fall upon a screen, an infinite variety of forms can be produced by simply revolving the model, although an effort was made to secure a symmetrical arrangement of the needles in the two zones.

The illustrations show the changes due to the apparent variation of the inclination of the Sun's axis to the line of sight.

No. 1 Earth at Sun's node.
2 Earth one month from Sun's node.
3 „ two months „ „
4 „ three months „ „

A discussion of the mechanical theory, together with a comparison showing the remarkable agreement with observation, will appear in the report of the eclipse of December 22, 1889.

Mount Hamilton:
1890 *March* 18.

G G

The Structure of the Sidereal Universe. By T. W. Backhouse.

(*Abstract.*)

Curves of stars have often been noted in the heavens, but less attention has been paid to what the writer has found to be a far more striking and prevalent feature, of which this paper more especially treats—*straight* lines and *parallel* arrangements of pairs, lines, and bands of stars, and also of irresolvable wisps.

A special small area of the sky, viz. that portion of the Milky Way included between 15, 13, 8 *Monocerotis*, *α Orionis*, *ζ Tauri*, and 5, *μ*, *ξ Geminorum*, has been selected for detailed scrutiny; and the descriptions refer chiefly to the configurations in this area. The observations have been made by the author during the last eight years, and nearly all of them at Sunderland; some are features noted by unaided vision, but most of them were gleaned by the use of a binocular field-glass of 2·05 inches aperture; a refracting telescope of $4\frac{1}{4}$ inches aperture being occasionally used.

The details are exhibited in tabular form in the original paper, and include features noticed in Argelander's *Atlas des nördlichen gestirnten Himmels.* Though the field-glass shows nearly as many stars as the maps, the same features are not always found, two suggested reasons for this being that stars separately too faint to be inserted in the maps may be impressed upon the eye by their united light; and, on the other hand, the appearance of a line may be destroyed by surrounding stars. Proctor's chart of the whole of Argelander's stars was also examined for comparison, and for the great cluster in *Gemini* the MM. Henry's photograph of that object.

The paper contains the following sections:—

Part I.—Lines and parallel arrangements of stars.
Part I*a*.—Lines and parallel arrangements in clusters.
Part II.—Nebulous wisps.
Part II*a*.—Nebulæ.

In these are given the detailed structure in different parts of the area, showing the various systems of parallel lines and wisps, together with their position-angles referred to that portion of Gould's Galactic Equator (vide *Uranometria Argentina*, p. 371), which runs through the middle of the area in question. For comparison are also given the position-angles, referred as above, of several well-recognised circles in the heavens as

Part III.—Miscellaneous lines.

Many of the details described are obvious on the most casual glance, and nearly all are conspicuous on careful scrutiny.

There is, besides the parallelisms, a most wonderful case of